LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA23 | Balsall Common and Hampton-in-Arden

Data appendix (AG-001-023)

Agriculture, forestry and soils

November 2013

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Appendix AG-001-023

Environmental topic:	Agriculture, forestry and soils	AG
Appendix name:	Data appendix	001
Community forum area:	Balsall Common and Hampton-in-Arden	023

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1 Introduction

1.1.1 The agriculture, forestry and soils appendices for the Balsall Common and Hampton-in-Arden community forum area (CFA 23) comprise:

- Soils and agricultural land classification surveys (Section 2);
- Forestry (Section 3); and
- Farm impact assessment summaries (Section 4).

1.1.2 Maps referred to throughout the agriculture, forestry and soils appendix are contained in the CFA23 Volume 5 map book.

2 Soils and agricultural land classification surveys

2.1 Background

2.1.1 The soils and agricultural baseline conditions reported have been established from desktop studies and site surveys.

2.1.2 Information gathered by desktop studies has related primarily to the identification of soil resources in the study area, the associated physical characteristics of geology, topography and climate which underpin the assessment of agricultural land quality, and the disposition of land uses. The main sources of information have included:

- National Soil Map[1];
- Soils and their use in South East/Midland and Western England[2];
- Soils in Warwickshire V Sheet SP27/37 (Coventry South)[3];
- solid and superficial deposits from the Geology of Britain viewer[4];
- gridpoint meteorological data for Agricultural Land Classification of England and Wales;[5]
- Agricultural Land Classification of England and Wales (1:250,000)[6];
- Likelihood of Best and Most Versatile Agricultural Land (1:250,000)[7];
- agri-environment schemes[8];
- aerial photography; and
- on-site soil and Agricultural Land Classification surveys.

2.1.3 Information gathered by field survey has related to the enhancement of desk-based information on soils and agricultural land quality, and the engagement with landowners and tenants to establish the nature and extent of agricultural, forestry and related rural enterprises.

1 Cranfield University, (2001), *The National Soil Map of England and Wales 1:250,000 scale*, Cranfield University: National Soil Resources Institute.

2 Soil Survey of England and Wales, (1984), *Soils and Their Use in Midland and Western England*, Harpenden.

3 G.R.Beard, (1984), *Soils in Warwickshire V Sheet SP27/37(Coventry South) Soil Survey Record No 81.*

4 British Geological Survey; Geology of Britain viewer; http://bgs.ac.uk/data/mapViewers/home.html; accessed: June 2013

5 Meteorological Office, (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.

6 Ministry of Agriculture, Fisheries and Food (MAFF), (1983), *Agricultural Land Classification of England and Wales (1:250,000).*

7 Department for Environment, Food and Rural Affairs (DEFRA), (2005), *Likelihood of Best and Most Versatile Agricultural Land (1:250,000).*

8 Multi-Agency Geographical Information for the Countryside (MAGIC); www.magic.gov.uk; accessed June 2013

2.1.4 Where the collection of agricultural site information has enabled a review/refinement of published information, this was undertaken in accordance the methodology prescribed by Ministry of Agriculture, Fisheries and Food (MAFF)[9].

2.1.5 Information obtained from farm impact assessment interview surveys has been taken as a factual representation of local agricultural and forestry interests and has not been subject to further evaluation.

2.2 Soils and land resources

2.2.1 This part of the appendix describes the findings of a desktop study and of available soil survey and Agricultural Land Classification (ALC) survey that identified existing soil and agricultural land resources within and immediately adjoining the study area. Detailed survey data comprises:

- Berkswell Quarry, Cornets End lane, Meriden–MAFF data 1992;[10] and
- Park Farm, Packington–Chamley Associates 2011.[11]

2.2.2 The location and extent of different soil types and agricultural land in the different ALC grades are influenced by topography and drainage, and by geology and soil parent materials, which are described in turn in the following sections. This section then provides a description and distribution of the main soil types encountered along the study corridor.

Topography and drainage

2.2.3 The main topographical feature of the study area is the floodplain of the River Blythe which runs northwards through the gap between Balsall Common and Hampton-in-Arden. The floodplain lies at 85m to 90m Above Ordnance Datum (AOD), and is extended by a number of small tributary valleys which join from the east, notably the Bayleys Brook, and from the west, notably Shadow Brook. These create a number of small hills and intervening rises.

2.2.4 The highest ground is found in a ridge located between Balsall Common and Benton Green which rises to about 130m AOD. This extends westwards at a slightly lower level to the south of Balsall Common. From this higher ground a tributary of the River Blythe, Bayleys Brook, runs north-west between Balsall Common and Berkswell through gently sloping terrain mainly below 100m AOD.

2.2.5 To the north of Hampton-in-Arden, the land rises to 95m AOD to the west of Moulding Green Farm, and 100m AOD at Diddington Hill. These two areas of higher ground are separated by the valley of Shadow Brook.

9 Ministry of Agriculture, Fisheries and Food (MAFF), (1988), *Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.*

10 Natural England Survey ref:008/92, (1992*), Report of the MAFF Agricultural Land Classification Survey – Berkswell Quarry, Cornets End Lane, Meriden.*

11 Chamley Associates, (2011), *Soil and Agricultural Land Classification Survey,* Packington Estate Enterprise Ltd. Park Farm.

Geology and soil parent materials

2.2.6 The predominant underlying geology mapped by the British Geological Survey[4] (BGS) is Triassic mudstones (Mercia Mudstone Group) with occasional occurrences of sandstone and siltstone. To the east and south-west of the River Blythe, this bedrock is largely overlain with glacial and fluvioglacial deposits (till, sand and gravel). The river valley itself and its tributaries are occupied by alluvial deposits and have adjoining areas of river terrace sand and gravel deposits, particularly in the vicinity of Bradnocks Marsh.

2.2.7 A list of geological strata occurring within the study area is provided in age order in Table 1 and shown in Volume 5: Map WR-02-023.

Table 1: Bedrock and soil forming materials

Formation	Composition/soil parent material
Bedrock	
Mercia Mudstone Group	Red mudstones and layers of dolomitic siltstones.
Arden Sandstone Formation	Grey, green and purple mudstones, interbedded with siltstones and sandstones
Bromsgrove Sandstone Formation	Red, brown and grey, pebbly sandstones, interbedded with siltstones and mudstones.
Tile Hill Mudstone Formation	Red-brown mudstones with subordinate sandstones
Superficial desposits	
Alluvium	Compressible silty clay, (silt, sand and gravel).
River Terrace Deposits 1	Sand and gravel.
Glaciofluvial Deposits	Sand and gravel
Till	Variable lithology, usually sandy, silty clay with pebbles, but can contain gravel-rich, or sand layers.

Description and distribution of soil types

2.2.8 The characteristics of the soils are described by the Soil Survey of England and Wales[12] that accompanies the National Soil Map[13]. The soils are grouped into soil associations of a range of soil types (soil series) showing similar characteristics.

2.2.9 The National Soil Map shows ten soil associations present in the study area, of which the following seven are the main associations pertinent to the Proposed Scheme:

- the floodplain of the River Blythe and its tributaries supports alluvial soils (Fladbury 1 association). These comprise medium or heavy clay loam topsoils overlying slowly permeable, clay subsoils derived from alluvial deposits and are subject to groundwater waterlogging associated with fluctuating river levels and perennial flooding. The drainage

12 Soil Survey of England and Wales, (1984), *Soils and their Use in Midland and Western England*, Bulletin 12.

13 Soil Survey of England and Wales, (1983), *Soils of Midland and Western England*, Sheet 3.

status of these soils places them in Wetness Class[14] (WC) IV;

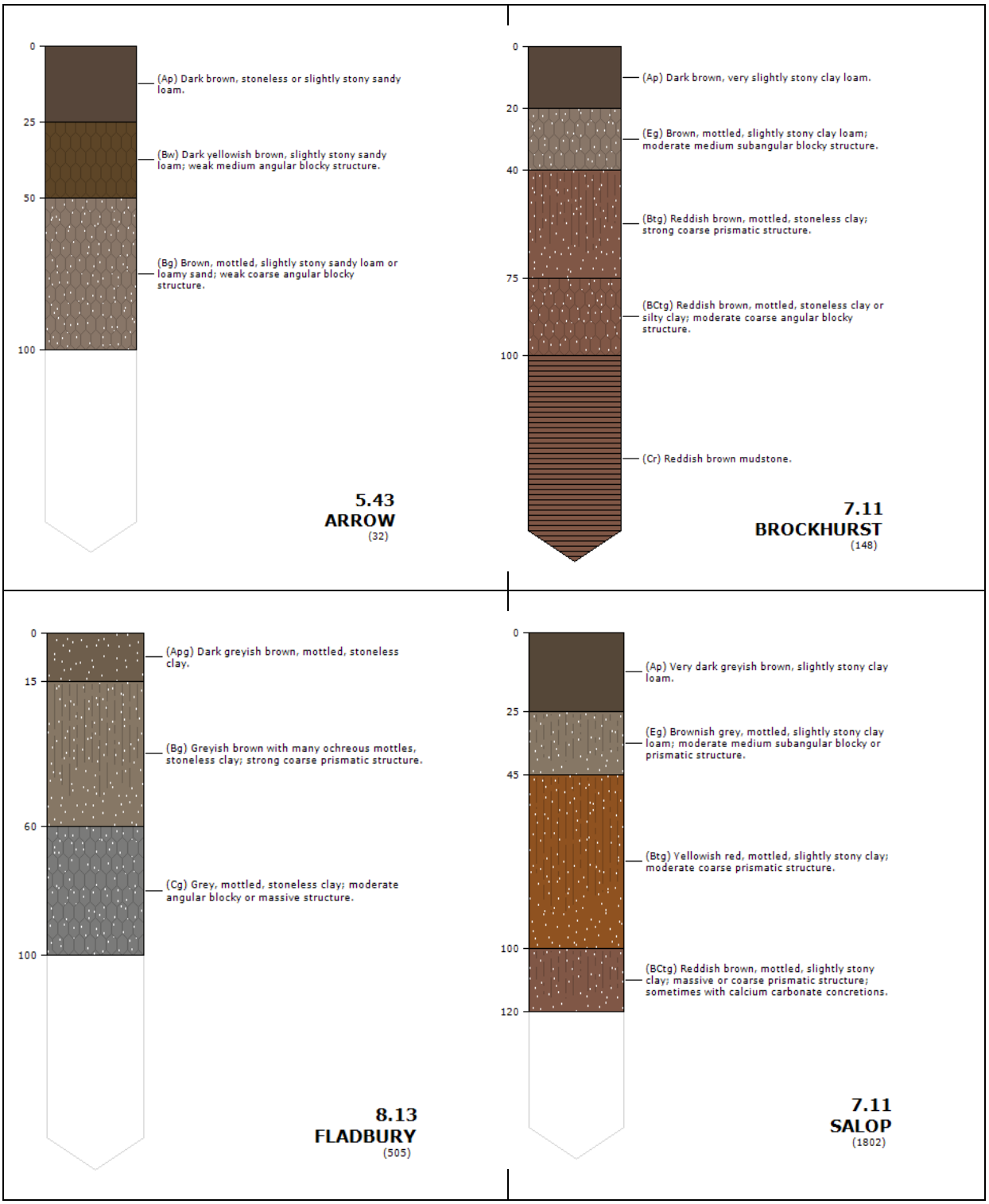
- to the east of the River Blythe, there are occurrences of fluvioglacial and river terrace sands and gravels which are associated with medium to coarse, loamy soils (Arrow association). These are of variable permeability and occasionally seasonally waterlogged. They are commonly assessed as being of WC II-III;
- in the vicinity of Hampton-in-Arden the underlying mudstone parent materials create a clayey subsoil leading to clay loam topsoil (Brockhurst 1 association). The slow permeability of the subsoils is reflected in these soils being generally attributed to WC III-IV;
- in the vicinity of Balsall Common soil parent materials are derived from a glacial till giving rise to clay to clay loam topsoils with slowly permeable subsoils of similar texture (Salop association). These soils fall with WC III-IV; and
- between Balsall Common and Berkswell, variable occurrences of the underlying geology of shales, mudstones and sandstones and superficial till deposits support a limited distribution of generally loamy topsoils over slowly permeable clayey subsoils. Over the reddish till deposits coarse loamy topsoils are recognised as Rufford soils and fine loamy topsoils as Flint association. Where the underlying bedrock provides the parent material the fine loamy or fine silty topsoils of the Whimple 2 association are present. All the soil types experience seasonal waterlogging and fall within WCIII.

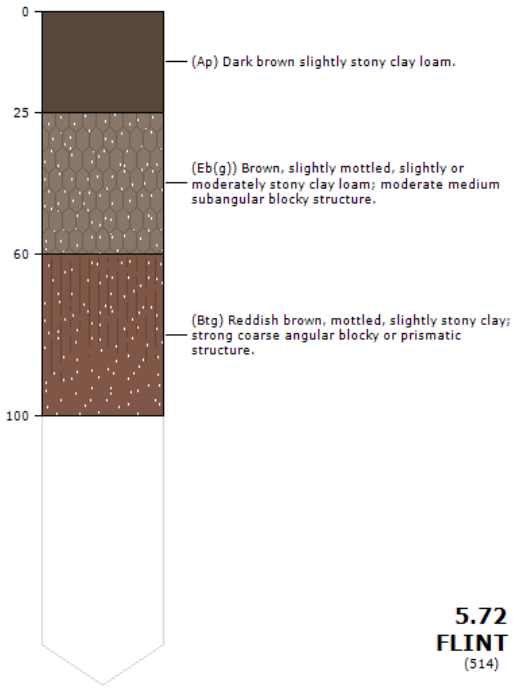
2.2.10 Small occurrences of Bromsgrove, Whimple 3 and Wick 1 associations are present and are not described.

2.2.11 Typical profiles for the main soil types present are depicted in Figure 1.

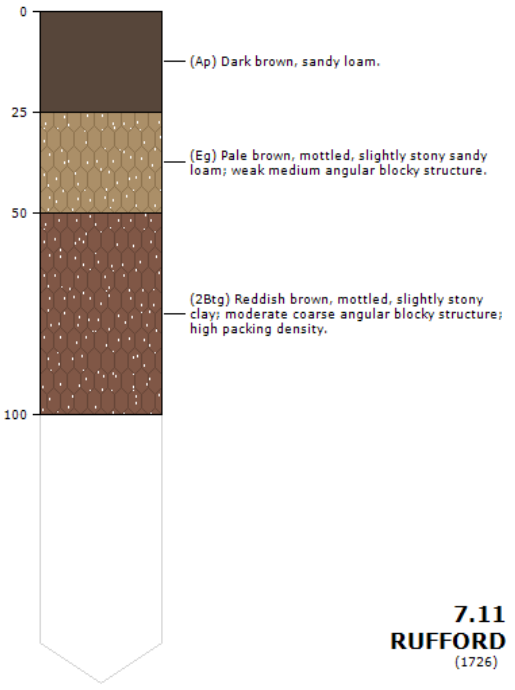
14 The Wetness Class (WC) of a soil is classified according to the depth and duration of waterlogging in the soil profile and has six bands.

Figure 1: Predominant soil series profile descriptions:

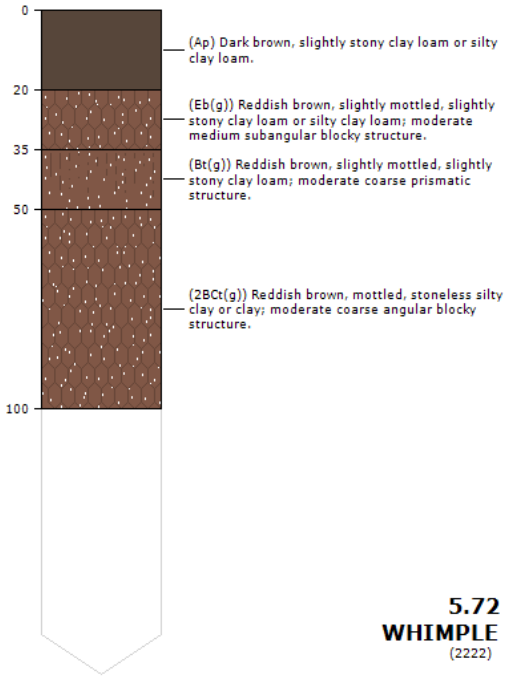




5.72
FLINT
(514)



7.11
RUFFORD
(1726)



5.72
WHIMPLE
(2222)

2.3 Soil and land use interactions

Agricultural land quality

2.3.1 There is detailed post-1988 ALC data available within the study area. This has formed the basis for an intensive desk based assessment of the remaining areas which has relied on the interpretation of soil mapping, topography and agro-climatic data, and the interactions between each factor. This resulted in an assessment of the likely soil textures, soil drainage status, landform, gradient, presence of or depth to poorly permeable soil layers and the extent to which crop growth may be limited by soil droughtiness.

2.3.2 Outside the areas for which detailed survey data is available, a professional judgement has then been made of predominant ALC grade which is likely for a soil with the given characteristics found, in the agro-climatic zone of the location within the area. The judgement is influenced by the surveyor's experience of previous surveys in the locality and on similar soil types. The resulting grade is that which is considered to be the most likely grade that would be found should a detailed site investigation be conducted, although this does not mean in all cases that grade will be found in practice.

2.3.3 The land quality context is initially derived from the provisional ALC maps of England and Wales, produced by MAFF in the 1960s and 1970s. These maps show the areas to be provisionally mapped as predominantly Grade 3, good to moderate quality land, with Grade 4, poor quality land on the floodplain areas. A narrow tract of Grade 2 is shown to the east of the River Blythe running northwards between Berkswell and Meriden.

2.3.4 These maps were originally published at a scale of 1:63,360 and are available at a scale of 1:250,000 in paper and digital formats. The main limitations of these provisional maps are that they are published on strategic scales only and according to a methodology which has since been revised twice. Therefore they cannot be used to definitively classify individual sites and hence further data analysis was conducted.

2.3.5 The principal physical factors influencing agricultural production and land quality are climate, site and soil, and the interactions between them.

Agro-climatic limitations

2.3.6 The climate in this part of England does not in itself place any limitation upon land quality, but the interactions of climate with soil characteristics are important in determining the wetness and droughtiness limitations of the land. The influence of climate on soil wetness is assessed by reference to median field capacity days (FCD) when the soil moisture deficit is zero, soil WC and topsoil texture. Droughtiness is determined by comparing the available water capacity of the soil (AP), adjusted for the crop, with the moisture deficit (MDM) for the locality for two crops, winter wheat (MDM WHT) and potatoes (MDM POT).

2.3.7 The local agro-climatic factors have been interpolated from the Meteorological Office's standard 5km grid point dataset at two points within the study area, as set out in Table 2. There is only a small variation across the study area. Average annual rainfall (AAR) is from 694 to 708 mm with higher ground tending to receive more. Median FCDs are 162 days. Moisture deficits are 95–99mm for wheat and 83–88mm for potatoes.

Table 2: Interpolated agro-climatic data

Agro-climatic parameter	**Hampton-in-Arden**	**Balsall Common**
Altitude (mAOD)	90 m	115m
Average annual rainfall (AAR)	694 mm	708 mm
Accumulated temperature >0°C (AT0)15	1385 day°	1357 day°
Field capacity days (FCD)	162 days	162 days
Average moisture deficit, wheat (MDM WHT)	99 mm	95 mm
Average moisture deficit, potatoes (MDM POT)	88 mm	83 mm

Site limitations

2.3.8 The assessment of site limitations is primarily concerned with the way in which topography influences the use of agricultural machinery and hence the cropping potential of land. Gradient and microrelief[16], with complex changes of slope angle or direction over short distances, are not considered limiting. Flooding in the study area is limited to the floodplains of the River Blythe and its tributaries. This is a potential limitation but its incidence is difficult to ascertain. Flood risk is determined by the extent, duration, frequency and timing of flooding events which may not have been recorded. However, the published flood maps by the Environment Agency can be used as a guide (see Volume 5: Map WR-05-151b to Map WR-05-153).

Soil limitations

2.3.9 The main soil properties which affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility. Together they influence the functions of soil and affect the water availability for crops, drainage, workability and trafficability. The main soil characteristics within the study area are:

- light loamy and sandy textures in river terrace and fluvioglacial deposits (Arrow association);
- loamy over clayey textures, commonly with poor subsoil structure and slow permeability,

15 Accumulated temperature is the excess of daily air temperatures above a selected threshold temperature (0°C), summed over a specified period (January to June which is the critical growth period for most crops).

16 Complex changes of slope angle and direction over short distances or the presence of boulders or rock outcrops, even on level or gentle slopes, which can severely limit the use of agricultural machinery.

over Mercia Mudstone and till (Salop, Brockhurst 1, Rufford, Flint and Whimple 2 associations); and

- clayey textures in alluvial soils in the valley bottoms with fluctuating groundwater (Fladbury 1 association).

2.3.10 Soil depth and chemical limitations are not encountered.

Interactive limitations

2.3.11 The physical limitations which result from interactions between climate, the site and soil are soil wetness, droughtiness and erosion. Each soil can be allocated a WC based on soil structure, evidence of waterlogging and the number of FCDs (Figure 2); the topsoil texture then determines its ALC Grade in accordance with the MAFF ALC guidelines (as detailed in Figure 3).

2.3.12 Deep light loamy and sandy soils of the Arrow association are permeable and largely well drained (WC I-II) or have slight seasonal waterlogging (WC II-III) where affected by fluctuating groundwater, and in both cases are without a wetness limitation. Seasonally waterlogged soils (WC III-IV) of the Brockhurst 1 and Salop associations will be limited to Subgrade 3a where the topsoil is medium clay loam, but Subgrade 3b where heavy clay loam. The soils of the Rufford, Flint and Whimple 2 associations have a generally more favourable drainage status but wetness will still constitute a limitation to Subgrade 3a. In wetter situations (WC IV) clayey topsoil textures of the Fladbury 1 association will limit the land to Subgrade 3b.

2.3.13 Soil texture and structure determine the available water capacity of the soil profile. When calculated against the demands of a growing wheat and potato crop in the locality given by the climatic variable, the moisture deficit, a moisture balance is produced from which a droughtiness limitation can be assessed. The majority of the soils present have clayey subsoils and have sufficient moisture reserves in an average year to have no droughtiness limitation. The lighter textured soils of the Arrow association, however, tend to have a smaller available water capacity and droughtiness limits the land to Grade 2 or Subgrade 3a depending on the stone content.

2.3.14 In the light of the above, the extensive occurrence of Arrow association soils over superficial sands and gravels has been assessed as predominantly of subgrade 3a quality due to the effect of the droughtiness limitation. Conversely, the soils of the River Blythe floodplain, with their combined texture and wetness limitation have been assessed as no higher than Subgrade 3b quality.

2.3.15 The remaining soil types are more variable in their circumstances, but soil wetness is the principal consideration. Dependent upon local circumstances of site, texture and drainage, the relevant land falls within Subgrades 3a and 3b of the ALC.

Figure 2: ALC grade according to soil wetness 1

Wetness Class	Texture[1] of the top 25 cm	Field Capacity Days				
		<126	126-150	151-175	176-225	>225
I	S[2] LS[3] SL SZL	1	1	1	1	2
	ZL MZCL MCL SCL	1	1	1	2	3a
	HZCL HCL	2	2	2	3a	3b
	SC ZC C	3a(2)	3a(2)	3a	3b	3b
II	S[2] LS[3] SL SZL	1	1	1	2	3a
	ZL MZCL MCL SCL	2	2	2	3a	3b
	HZCL HCL	3a(2)	3a(2)	3a	3a	3b
	SC ZC C	3a(2)	3b(3a)	3b	3b	3b
III	S[2] LS SL SZL	2	2	2	3a	3b
	ZL MZCL MCL SCL	3a(2)	3a(2)	3a	3a	3b
	HZCL HCL	3b(3a)	3b(3a)	3b	3b	4
	SC ZC C	3b(3a)	3b(3a)	3b	4	4
IV	S[2] LS SL SZL	3a	3a	3a	3b	3b
	ZL MZCL MCL SCL	3b	3b	3b	3b	3b
	HZCL HCL	3b	3b	3b	4	4
	SC ZC C	3b	3b	3b	4	5
V	S LS SL SZL	4	4	4	4	4
	ZL MZCL MCL SCL	4	4	4	4	4
	HZCL HCL	4	4	4	4	4
	SC ZC C	4	4	4	5	5
Soils in Wetness Class VI - Grade 5						

Notes for Figure 2: 1. For naturally calcareous soils with more than1% calcium carbonate ($CaCO_3$) and between 18% and 50% clay in the top 25cm, the grade, where different from that of other soils, is shown in brackets; and 2. Sand is not eligible for Grades 1,2 or 3a; 3. Loamy sand is not eligible for Grade 1.

Figure 3: Methodology for calculating the severity of a droughtiness limitation to ALC grading (derived from MAFF, 1988)

$$\text{AP wheat (mm)} = \frac{TA_{vt} \times LT_t + \Sigma (TA_{vs} \times LT_{50}) + \Sigma (EA_{vs} \times LT_{50\text{-}120})}{10}$$

where

TA_{vt} is Total available water (TA_v) for the topsoil texture

TA_{vs} is Total available water (TA_v) for each subsoil layer

EA_{vs} is Easily available water (EA_v) for each subsoil layer

LT_t is thickness (cm) of topsoil layer

LT_{50} is thickness (cm) of each subsoil layer to 50 cm depth

$LT_{50\text{-}120}$ is thickness (cm) of each subsoil layer between 50 and 120 cm depth

Σ means 'sum of'.

$$\text{AP potatoes (mm)} = \frac{TA_{vt} \times LT_t + \Sigma (TA_{vs} \times LT_{70})}{10}$$

where

LT_{70} is thickness (cm) of each subsoil layer to 70 cm depth

MB (Wheat) = **AP** (Wheat) **- MD** (Wheat)
MB (Potatoes) = **AP** (Potatoes) **- MD** (Potatoes)

Where
MB is the Moisture Balance
AP is the Crop-adjusted available water capacity
MD is the moisture deficit, as determined by the agro-climatic assessment.

Grade according to droughtiness

Grade/ Subgrade	Moisture Balance limits (mm) *wheat*		*potatoes*
1	+30	*and*	+10
2	+5	*and*	-10
3a	-20	*and*	-30
3b	-50	*and*	-55
4	<-50	*or*	<-55

3 Forestry

3.1.1 Assessment of forestry resources has primarily had regard to the Forestry Inventory[17].

3.1.2 The area of land under forestry (i.e. trees and woodland) within a 4km wide study area (2km either side of the route centre line of the Proposed Scheme) has been determined using GIS, and is shown in Table 3.

3.1.3 Substantial woodland areas are located between Berkswell and Hampton-in-Arden (The Marlowes, The Bogs, Sixteen Acre Wood and Siden Hill Wood).

Table 3: Area of woodland within the study area and land required for construction

	Area of forestry land (ha)	**Forestry land as a % of total land area**
Forestry land in study area	340	6
Forestry land within area required for construction	13.1	5.3

3.1.4 The coverage of forestry land in the study area, i.e. a 4km-wide corridor, is 6% which is less than the national average woodland coverage (10%). Forestry land is, therefore, a resource of medium sensitivity in this locality.

3.1.5 The extent of forestry land affected by the construction of the Proposed Scheme is some 4% of the total land requirement, which is an impact of low magnitude in terms of the assessment methodology. This is a minor adverse effect which is not significant.

17 Forestry Commission; National Forest Inventory Woodland and Ancient Woodland Woodland Area *Planting and Restocking*; www.forestry.gov.uk/pdf/WAPR2013.pdf/$FILE/WARP2013.pdf; accessed: June 2013

4 Assessment of effects on holdings

4.1.1 The effects on farm holdings have been assessed according to the methodology set out in the Addendum to the Scope and Methodology Report (see Volume 5: Appendix CT-001-000/2). The necessary data has been collected through contact and/or interviews with affected farmers and other rural interests along the route. Where this has not been possible, the data has been estimated.

4.1.2 The nature of impacts considered comprises the temporary and permanent land requirements from the holding, the temporary and permanent severance of land, the permanent loss of key farm infrastructure and the imposition of disruptive effects (particularly noise and dust) on land uses and the holding's operations. These impacts occur primarily during the construction phase of the Proposed Scheme and are set out in Table 4.

Table 4: Summary of assessment of effect on holdings

Holding reference, name and description	**Construction effects**	**Residual effects**
CFA 23/1 Land west of B4101 Waste Lane, part Dumble Farm, Coleshill Size unknown* assessed as at least 50ha arable Medium sensitivity to change	Land required 9.5ha; 19% Medium impact. Land required for formation of balancing pond, with access off Kenilworth Greenway, and diversion of existing ditch. Temporary requirements for diversion of Kenilworth Greenway, siting of the Beechwood Farm accommodation underpass satellite compound and areas of temporary material storage. Severance: No severance effects. Negligible impact. Disruptive effects: No effects. Negligible impact. Overall temporary assessment: Moderate impact - significant.	Land required 1.5ha; 3% Negligible impact. Balancing pond and associated access and drainage works. Severance: No effects. Negligible impact. Infrastructure: No effects. Negligible impact. Overall permanent assessment: Negligible-not significant.
CFA 23/2 Barratts Lane Farm Size unknown* assessed as at least 50ha arable and livestock Medium sensitivity to change	Land required 0.5ha; 1% Negligible impact. Land within potential construction boundary. Temporary alternative route for the Kenilworth Greenway. Severance: No severance effects. Negligible impact. Disruptive effects: No effects. Negligible impact. Overall temporary assessment; Negligible impact -not significant	Land required 0.1ha; Negligible impact Reinstatement of Greenway Severance: No effects. Negligible impact Infrastructure: No effects. Negligible impact. Overall permanent assessment: Negligible - not significant.
CFA23/3 Beechwood Farm	Land required 8.4ha: 74% of holding. High impact. Land required for construction of route, diversion	Land required 4.6ha; 40% of holding. High impact Permanent land requirement restricted to formation of route and landscape planting.

Holding reference, name and description	Construction effects	Residual effects
11.4ha Equestrian (non-commercial) Low sensitivity to change	of oil pipeline and ground remodelling. Severance: No severance effects; access retained to residual areas of land. Low impact. Disruptive effects: No effects. Negligible impact. Overall temporary assessment: Moderate impact due to scale of land requirement - significant	Regraded land reinstated to agricultural condition. Severance: Severance of existing field unit due to regrading of land and formation of a toe ditch. Low impact. Infrastructure: No effects. Overall permanent assessment: Moderate impact - significant.
CFA23/4 Truggist Hill Farm 15.3ha Equestrian (commercial) High sensitivity to change	Land required 4.5ha; 29% of holding. High impact. Land required for construction of route, for landscape planting, and diversion of watercourse and public right of way (PRoW). Temporary loss of rented land at Beechwood Farm to regrading earthworks and owned land to haul road to Truggist Lane and satellite works compounds. Severance: No effects. Negligible impact. Disruptive effects: Loss of main building to construction works. High impact. Overall temporary assessment: Major impact - significant	Land required 1.8ha; 12% of holding. Medium impact Route and landscaping works. Severance: No permanent severance. Negligible. Infrastructure: Loss of main farm building and associated operational yard area. High impact. Disruption: reinstated land currently rented at Beechwood Farm subject to aftercare constraints. Overall permanent assessment: Major impact - significant
CFA23/5 Berkswell House c4.5ha Residential Low sensitivity to change	Land required 3.8ha; 84% of holding. High impact. Land required for construction of route, formation of balancing pond, and landscape planting. Ground remodelling works. Severance: No severance; all open land affected during construction phase. Disruptive effects: No agricultural effects. Overall temporary assessment: Moderate impact - significant	Land required 2.4ha; 53% of holding. High impact. Route, balancing pond and landscaping works. Regarded land north of the Proposed Scheme reinstated to agricultural condition. Severance: No effects as land to south of the Proposed Scheme fully utilised by permanent works. Infrastructure: No effects. Overall permanent assessment: Moderate impact - significant.
CFA23/6 Village Farm 65.7ha Livestock (beef) Medium sensitivity to change	Land required 2.3ha; 4% of holding. Negligible impact. On part of holding at Truggist Lane, land required to construct route on viaduct, for underground diversion of an existing overhead power line, and landscape planting. Temporary land requirement for haul road and temporary watercourse realignment. On part of holding adjoining Lavender Hall Lane, Land required for landscape planting. Severance: Building will be unable to be accessed by larger equipment as severed from main access in Truggist Lane. Alternative access from Baulk	Land required 1.3ha; 2% of holding. Negligible impact. Loss of land to mitigation planting at Truggist Lane and Lavender Hall Lane and supports for Balsall Common viaduct. Severance: No severance. Access beneath viaduct at Truggist Lane provided by Proposed Scheme connecting to existing field access. Infrastructure: Proximity of farm building to viaduct may prejudice its use a livestock shelter due operational noise effects. Low impact. Overall permanent assessment: Minor impact-not significant.

Holding reference, name and description	Construction effects	Residual effects
	Lane unsuitable. High impact Proximity of farm building to construction activity may prejudice its use as a livestock shelter. Low impact. Overall temporary assessment: Major/Moderate impact - significant, due to potential access issues. Application of code of construction practice (CoCP) may enable mitigation.	
CFA 23/7 Ram Hall Farm Size unknown* assessed as at least 75ha Livestock (sheep) Medium sensitivity to change	Land.required 18.2ha; 24% of holding. Highimpact Land required for construction of route, the realignment of Lavender Hall Lane, diversion of water main, landscape planting and formation of floodplain replacement storage area, temporary materials storage, haul road and Balsall Common viaduct satellite compound. Severance: No effects. Negligible impact. Disruptive effects: Disruption to existing field accesses if land within construction area available for agricultural use during construction. Overall temporary assessment: Moderate impact - significant	Land required 3.7ha; 5% of holding. Negligible impact Loss of land to route and realignment of Lavender Hall Lane, and diminution in utility of land required for flood replacement storage area. Severance: Loss of field access into Lavender Hall Lane replaced as part of design of Proposed Scheme with length of internal farm track. Severed land to south of the Proposed Scheme utilised for mitigation planting. Negligible impact Infrastructure: No effects. Negligible impact. Overall permanent assessment: Negligible Impact-not significant
CFA 23/8 Land off Park Lane 224.8ha Arable Medium sensitivity to change	Land required 20.4ha; 9.% of holding. Low impact. Land required for construction of route and diversion of Park Lane. Remaining land required temporarily for siting of Park Lane cutting main compound, temporary materials storage areas, and haul road. Severance: No severance during construction as all land affected by Proposed Scheme. Negligible impact. Disruptive effects: No effects; whole of land unit unavailable during construction. Negligible impact. Overall temporary assessment: Minor impact-not significant	Land required 2.0ha;0.9%of holding. Negligible impact. Loss of land to route and diversion of Park Lane along its southern side. Severance: Unit severed by the route and Park Lane diversion. New field access provided by Proposed scheme to severed parcels south of the route. Closure of Park Lane does not preclude continued use of existing access to adjoining land. Medium impact. Infrastructure: No effects. Negligible impact. Disruption: all land required temporarily reinstated to agricultural condition but subject to aftercare constraints. Low impact. Overall permanent assessment: Moderate impact - not significant
CFA 23/9 New Mercote/Mercote Mill Farm 315 ha Arable Medium sensitivity to	Land required 47.1ha; 15% of holding. Medium impact Land required to construct the route from Park Lane to Sixteen Acre Wood, landscape and ecological mitigation, excavation of floodplain replacement storage area beneath Marsh Farm viaduct, realignment of A452 Kenilworth Road, Mercote Hall Lane (Bridleway M218)	Land required 14.2ha; 5% of holding. Negligible impact. The Proposed Scheme between Park Lane to Sixteen Acre Wood, floodplain replacement storage area, realignment of A452 Kenilworth Road, construction of Mercote Hall Lane (Bridleway M218) accommodation overbridge and farms access. Loss of field units near Top Lodge to

Holding reference, name and description	Construction effects	Residual effects
change	accommodation overbridge and farm access, and gas main diversion through field adjacent to A452 Kenilworth Road. Temporary land requirements for haul road and Footpath M214 overbridge satellite compound in vicinity of Top Lodge; land regrading works between the Marlowes and Sixteen Acre Wood on east side of the route and haul road to west side; temporary material stockpile areas, satellite compound and works area north of the farm access to Mercote Mill Farm off the A452 Kenilworth Road; Severance: Field severance between the Marlowes and Sixteen Acre Wood. Existing access to fields adjacent to A452 Kenilworth Road; constrained alternative internal access to land east of the Proposed Scheme. Strategic severance arising from closure of Park Lane. Medium impact. Disruptive effects: Lengthening of operational journeys. Overall temporary assessment: Moderate impact - significant	mitigation planting. Diminution in utility of land required for floodplain replacement storage area. Regarding works reinstated to agricultural use. Severance: Severance effects mitigated by provision within Proposed Scheme of an overbridge between Marlowes and Sixteen Acre Wood. Increased operational journey lengths incurred. Low to Medium impact. Infrastructure: No effects. Negligible impact. Overall permanent assessment: Minor impact-not significant.
CFA 23/10 Berkswell Estate (forestry) 49ha Forestry (within agricultural estate) Medium sensitivity to change	Land required 6ha; 12% of forestry holding. Medium impact Woodland required at Park Lane, Marlowes and Sixteen Acre Wood for construction of the route. Temporary requirement of land for materials storage area at Marlowes and construction land at Sixteen Acre Wood. Replanted post construction. Severance: No effects. Negligible impact. Disruptive effects: No forestry effects. Possible disturbance to use of shooting rights by local syndicate during construction. Low impact Overall temporary assessment: Moderate impact - significant	Land required 4.8ha; 10% of forestry holding. Low impact Permanent loss of woodland at Park Lane, Marlowes and Sixteen Acre Wood. Severance: Access provided or retained in Proposed Scheme to residual woodland and replacement planting. Negligible impact. Infrastructure: No Effects. Negligible impact Overall permanent assessment: Minor impact - not significant.
CFA23/11 Marsh Farm 33.8ha Livestock (beef) Medium sensitivity to change	Land required 19.5ha; 57% of holding. High impact Land required through the length of farm to construct route and associated drainage works. Additional requirements for access track from A452 Kenilworth Road to the Bradnock auto-transformer station, balancing pond and mitigation planting near farmstead. Temporary land requirements for materials storage areas and the Bradnock auto-transformer station satellite compound between Sixteen Acre Wood and A452 Kenilworth Road/Bradnocks	Land required 8.5ha; 25% of holding. High impact. Route and associate drainage works. Loss of severed land adjacent to Sixteen Acre Wood to mitigation planting. Additional losses to access track from A452 Kenilworth Road/Bradnocks Marsh Lane roundabout to the Bradnock auto-transformer station, access to a balancing pond and mitigation planting near farmstead. Severance: Permanent severance effects created by new access track to Bradnock auto-transformer station. Low impact.

Holding reference, name and description	Construction effects	Residual effects
	Marsh Lane roundabout. Severance: Field severance and severance of internal movements through farm. Existing internal access available to land north of storage area and the A452 Kenilworth Road overbridge satellite compound area, but access to land to the south will require use of access off A452 Kenilworth Road. Medium impact. Disruptive effects: Operational movements, especially of livestock prejudiced. Overall temporary assessment: Major/Moderate impact - significant; due to scale of land requirement and operational disruption.	Infrastructure: No effects. Negligible impact. Overall permanent assessment: Major/Moderate impact - significant; due to scale of land requirement.
CFA 23/12 Horn Brook Farm 4.8ha Equestrian Low sensitivity to change	Land required 2.4ha; 50% of holding. High impact Land required for the realignment of A452 Kenilworth Road and watercourse realignment, and associated landscape planting. Severance: No effects. Negligible impact Disruptive effects: no effects. Negligible impact. Overall temporary assessment: Moderate impact - significant; due to scale of land requirement.	Land required 0.4ha;8% of holding. Low impact. Land required for realigned A452 Kenilworth Road and Horn Brook, and for associated mitigation planting. Severance: No effects. Severed land incorporated into mitigation planting. Negligible impact. Infrastructure: No effects. Negligible impact. Overall permanent assessment: Negligible impact-not significant.
CFA 23/13 Packington Estate (Marsh Lane Nature Reserve) 30.4ha Nature reserve Medium sensitivity to change	Land required 3.8ha; 13% of holding. Medium impact. Land required for route, excavation of a balancing pond, ecological mitigation works and construction haul road. Severance: Severed land utilised by permanent works and ecological mitigation. Negligible impact. Disruptive effects: Interference with nature conservation activity and visitor enjoyment, and existing use of Marsh Lane between Patricks Farm and the nature reserve. Low impact. Overall temporary assessment: Moderate impact-significant.	Land required 1.9ha; 6%of holding. Low impact. Land required for route, excavation of balancing pond and ecological mitigation works Severance: No effects. Negligible impact. Infrastructure: No effects. Negligible impact. Overall permanent assessment: Minor impact-not significant
CFA 23/14 Dairy Farm 700ha Arable and livestock (sheep and beef) Medium sensitivity to	Land required 24.2ha; 4% of holding. Negligible impact. Land required for the construction of the route and provision of ecological mitigation. Excavation of balancing pond and ground re-modelling Extensive area required for temporary materials storage, a satellite works compound, and connecting haul roads south from Meriden Lane	Land required 6ha; 0.9% of holding. Negligible impact. Route, balancing pond and ecological mitigation. New access track from B4102 Meriden Road to Marsh Lane and balancing pond. Regraded land reinstated to agricultural use. Severance: Existing field access into Meriden Lane retained and provision made in Proposed Scheme

Holding reference, name and description	Construction effects	Residual effects
change	and north to crossing of River Blythe. Severance: Field severance between Meriden Lane and River Blythe, but existing field access located within defined construction land likely to remain available. Low impact. Disruptive effects: Closure of Marsh Lane impacts on operational movements. Overall temporary assessment: Minor impact - not significant.	for access beneath the River Blythe viaduct; no permanent severance effects. Alternative access to Marsh Lane provided. Low impact. Infrastructure: No effects. Negligible impact. Overall permanent assessment: Minor impact-not significant
CFA 23/15 Mouldings Green Farm 48ha Arable and livestock (sheep and beef) Medium sensitivity to change	Land required 13.4ha; 28% of holding. High impact. Land required to construct embankments associated with the River Blythe viaduct, and for ecological mitigation. Temporary land required for haul road and connecting spur to Diddington Lane and temporary materials storage areas. Severance: The construction phase splits the holding into two units removing the existing connections between them. However both units remain accessible from existing accesses. Low impact Disruptive effects: Closure of Diddington Lane requires operational journeys from the farmstead to the Diddington Lane land and return via B4102 Meriden Road to the farmstead requiring lengthening of operational movements. Low impact. Overall temporary assessment: Major/Moderate impact - significant	Land required 3.6ha; 8% of holding. Low impact. Land loss to embankments associated with the River Blythe viaduct, and for ecological mitigation planting. Severance: Internal movement between the farmstead and Diddington Lane land is re-established by provision of access beneath the River Blythe viaduct. Low impact. Infrastructure: No effects. Overall permanent assessment: Minor impact - not significant
CFA 23/16 Home Farm, Hampton-in-Arden 324ha Arable and livestock (sheep and beef) Medium sensitivity to change	Land required 22.5ha; 7% of holding. Low impact. With 2.9ha required in CFA24, total requirement of 25.4ha; 8% of holding. Low impact Land required for the construction of the route and for balancing ponds to the north and south of Shadow Brook, and landscape planting. Land is required for a balancing pond adjacent to the Stonebridge Island which sits within this area and within the Birmingham Interchange and Chelmsley Wood area (CFA24) Land is required temporarily for haul roads and material storage areas and the Shadow Brook underbridge satellite compound. Within CFA 24 land is also required for the above temporary uses.	Land required 8.5ha; 3% of holding. Low impact. With 0.4ha required in CFA24, total requirement of 8.9ha; 3% of holding. Negligible impact. Land required by route and for balancing ponds to the north and south of Shadow Brook at the Diddington Lane crossing, and adjacent to the Stonebridge Island. Severance: Severed land to the west of the route remains available for agricultural use through provision of the Pasture Farm accommodation overbridge and length of farm track near Pasture Farm. Field accesses reinstated off Diddington Lane. Low impact. Infrastructure: No effects. Negligible impact Disruptive effects: Closure of Diddington Lane will

Holding reference, name and description	Construction effects	Residual effects
	Severance: Severed land to the west of the route will be wholly utilised during construction. Land to the east of Diddington Lane will be severed from existing field accesses by the defined construction land requirements. Land south of Shadow Brook will only accessible from an existing constrained access off the A452 Kenilworth Road. Medium impact. Disruptive effects: Closure of Diddington Lane will preclude existing operational movements from the main farm centre, requiring the use of B4102 Meriden Road and the A452 Kenilworth Road. Medium impact. Overall temporary assessment: Moderate impact - significant	preclude existing operational movements from the main farm centre, requiring the use of B4102 Meriden Road and the A452 Kenilworth Road. Loss of field access off Diddington Lane at Shadow Brook crossing requires use of unsatisfactory access off A452 Kenilworth Road Medium impact. Overall permanent assessment: Moderate impact-significant; due to permanent disruption to operational movements.
CFA 23/17 Firs Farm Size unknown* assessed as at least 100ha arable and livestock Medium sensitivity to change	Land required 5.6ha; 6% of holding. Low impact. Land requirement is restricted to part of a single field, which includes a small area of route embankment works and a temporary haul road. Severance: The haul road severs the access in Diddington Lane to the affected field unit. Disruptive effects: No effects. Negligible impact. Overall temporary assessment: Minor impact-not significant	Land required 0.5ha; Negligible impact Small land requirement for route embankment works. Severance: No effects. Replacement access into closed section of Diddington Lane. Low impact Infrastructure: No effects. Negligible impact. Overall permanent assessment: Minor impact-not significant

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